Innovative
Solutions

Low-Temperature Belt Dryer

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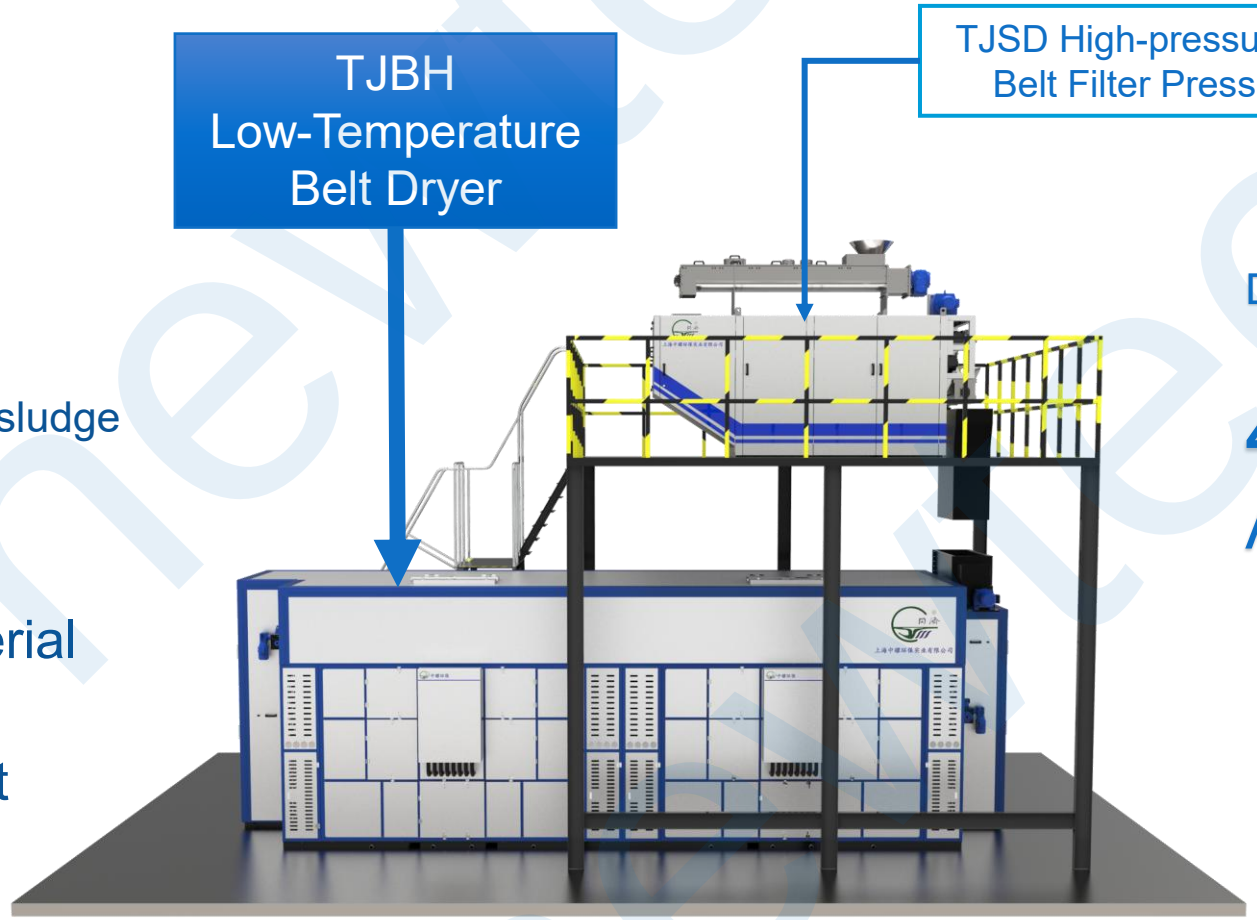
Applications

For drying:

- Municipal sludge
- Industrial sludge
  - Chemical sludge
  - Paper sludge
  - Plating sludge
  - Printing and dyeing sludge
  - Hazardous waste
- Animal manure
- Herbal remedy material
- Industrial product or intermediate product



Dryness of the output material:

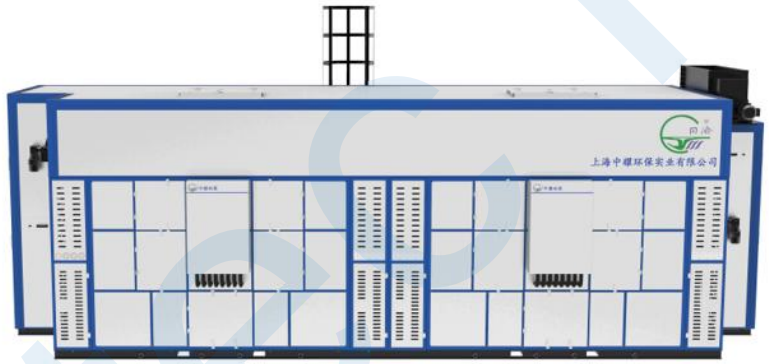
40 – 90% DS

Adjustable

Heat Pump type & **Waste Heat Recovery** type

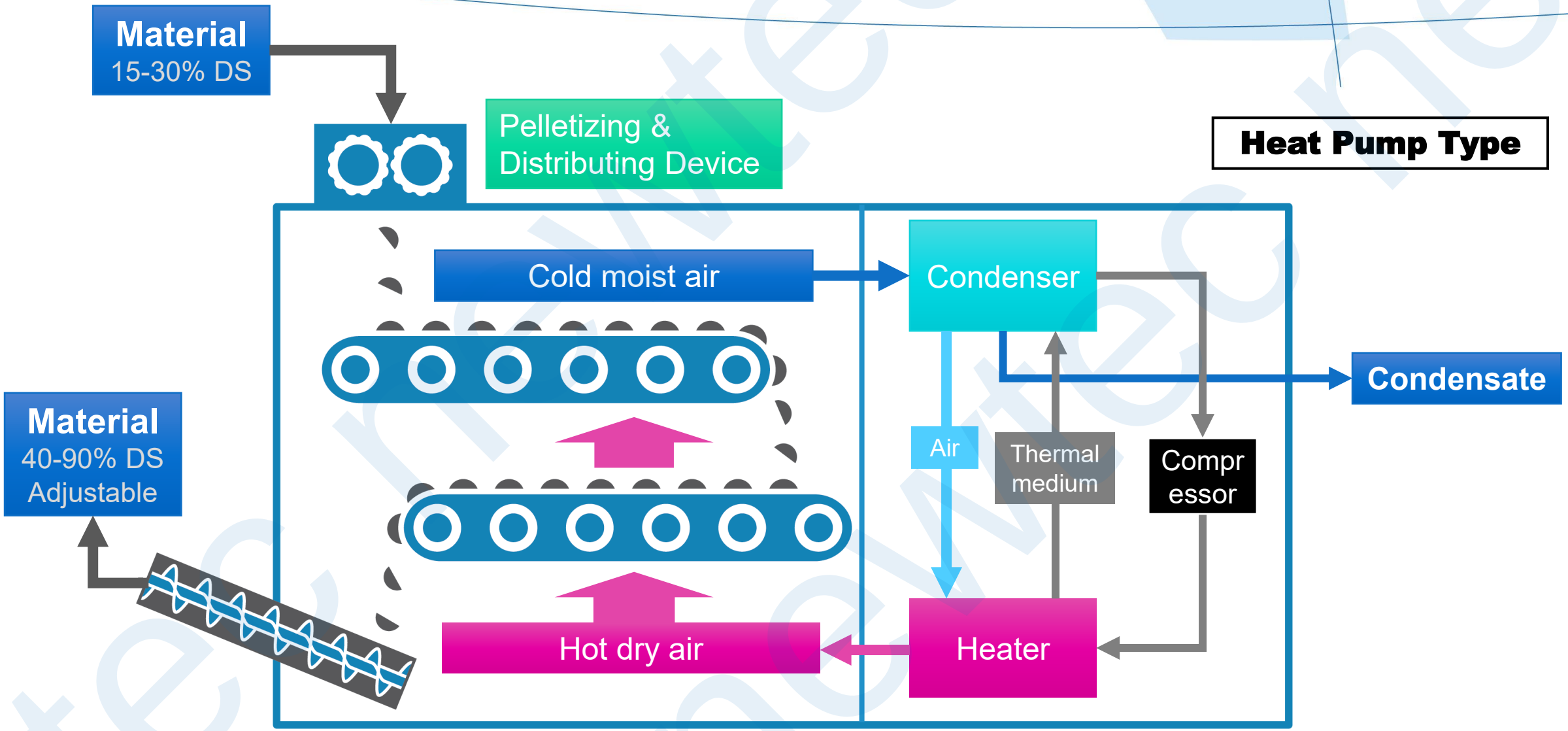
Two types of low-temperature belt dryers for two application scenarios.

- **Heat pump type**
- **Waste heat recovery type**

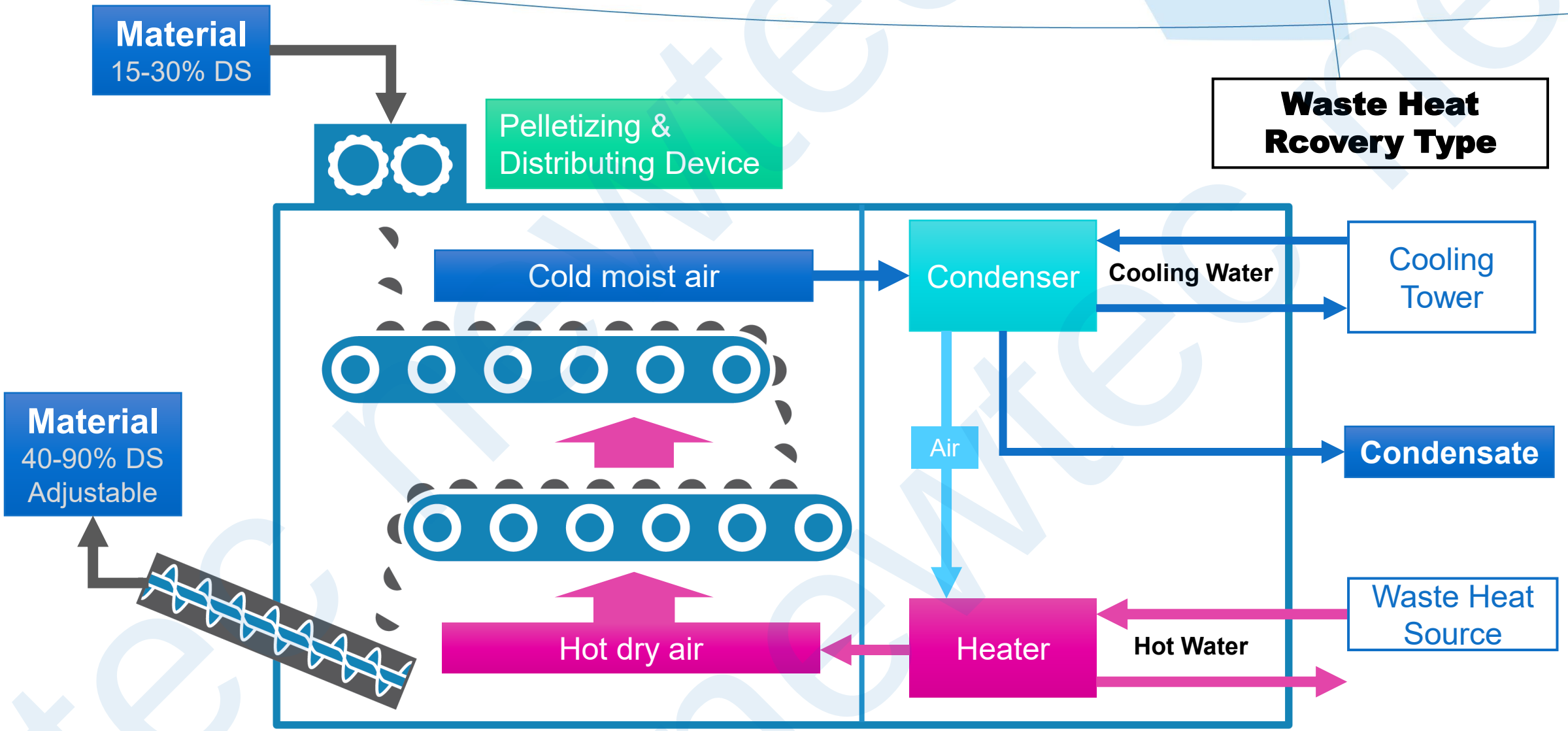


Type	Application scenario
Heat pump type	Where there is no waste heat to be utilized, the equipment comes with a heat pump system, which utilizes the heat released from the condensation of waste vapors obtained from sludge evaporation, together with the energy input from the compressor, to heat up the circulating air and obtain the dry hot air used to evaporate the sludge moisture.
Waste Heat Recovery Type	Where waste heat can be utilized, such as low pressure steam, hot water, or low temperature flue gas. Hot water of 70-90 °C is obtained through a heat exchanger and used to heat the circulating air to dry the sludge. The circulating air carrying the waste steam is cooled with another cooling water to condense the waste steam.

Process - Heat Pump Type



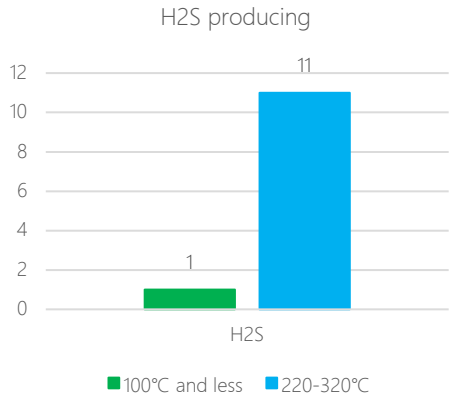
Process - Waste Heat Recovery Type

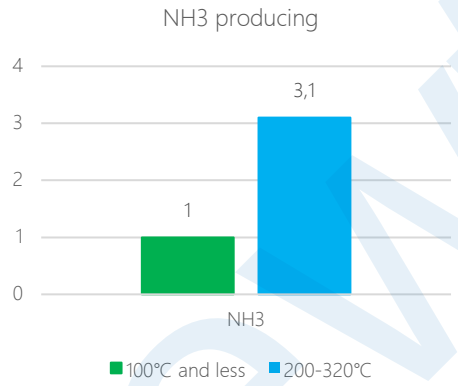


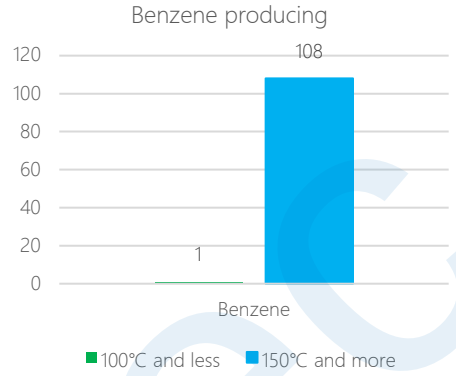
Energy Saving

1. Low-grade heat energy can be utilized.
2. The heat pump type can generate 3 kWh of heat for every 1 kWh of electrical energy consumed.
3. Three warming steps and four cooling steps for water removal bring high energy efficiency.
4. Carrier air cycled and no exhaust air emission, makes the heat loss as little as possible.

Technical characteristics







Environmentally friendly

1. Compared to medium- or high-temperature drying, low-temperature drying produces much less odor. Let the gaseous pollutants produced by medium- or high-temperature drying be 100%, and those produced by low-temperature drying can be approximately:
   - H2S 10%
   - NH3 30%
   - Benzene 1%
2. Compared to medium- or high-temperature drying, low-temperature drying produces much less dust and results in clear condensate.

Low-temperature drying vs. medium-

	Low-temperature Belt Dryer	Medium-temperature Belt Dryer
Working temperature	40 - 80 °C	110 - 150 °C
Operation mode	Closed, less energy loss	Open, more energy loss
Heat source	Waste heat or heat pump	Coal, fuel, landfill gas
Exhaust gas treatment	Not needed	Needed
Product cooling	Not needed	Needed
Operation cost	Lower	Higher

Low-temperature drying vs. Rotary kiln

	Low-temperature Belt Dryer	Rotary kiln
Fuel consuming	80 – 85 m³ NG / ton DS (From 30%DS to 55%DS)	180 – 230 m³ NG / ton DS (From 30%DS to 55%DS)
Electricity consuming	40 kWh / ton DS	30 kWh / ton DS
Maintenance	Once every 30 days to clean the pulsation de-dusting module	Almost daily cleaning of dust collectors, etc.
Deflagration risk	No deflagration risk for the operation temperature 80 °C	Higher deflagration risk for the higher operation temperature
Product cooling	Not needed	Needed

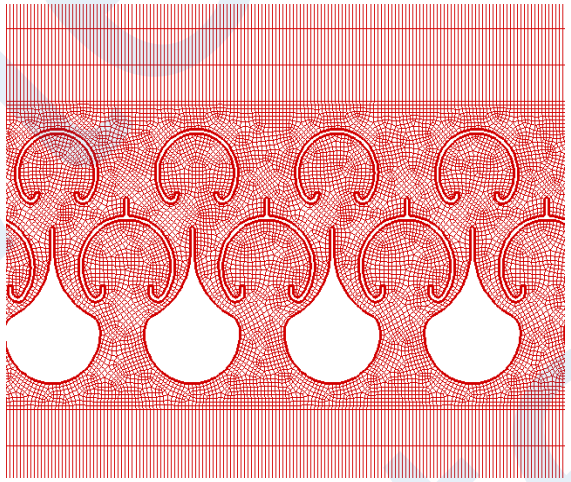
Economic Advantages

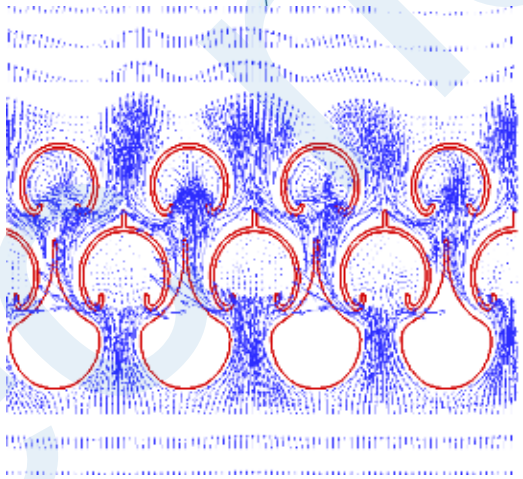
	Low-temperature Belt Dryer **Heat Pump Type**	Low-temperature Belt Dryer **Waste Heat Recovery Type**
Operation	Fully automatic operation	
Number of personnel	1 personnel for operation	
Mechanical wear	Few	
Electricity consuming	160 - 180 kWh / tonDS (From 20% DS to 60% DS)	40 kWh / tonDS (From 20% DS to 60% DS)
	180 - 200 kWh / tonDS (From 20% DS to 70% DS)	50 kWh / tonDS (From 20% DS to 70% DS)
External heat source	Not needed	Needed

Technological innovation - Solving dust problems

Dusts

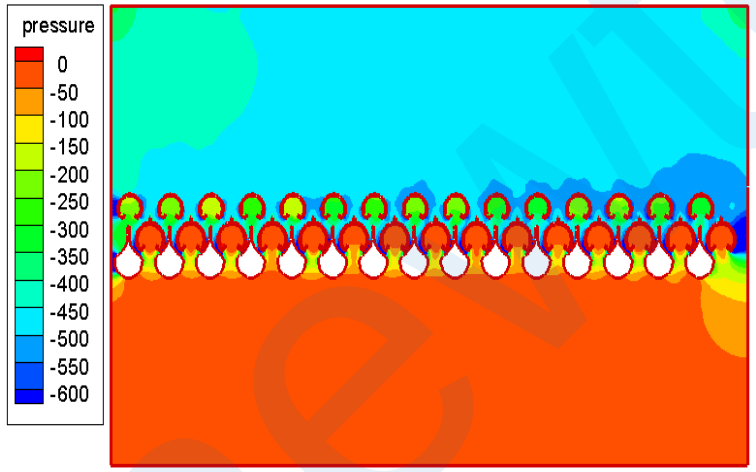
- Reduce mechanical properties
- Increase heat loss
- Increase corrosion





Technological innovation

- Innovative automatic dust extraction system, designed according to hydrodynamics
- Innovative multi-channel filtration system
- Tested and verified by specialized research laboratories



CFD Analysis and Filtration Laboratory

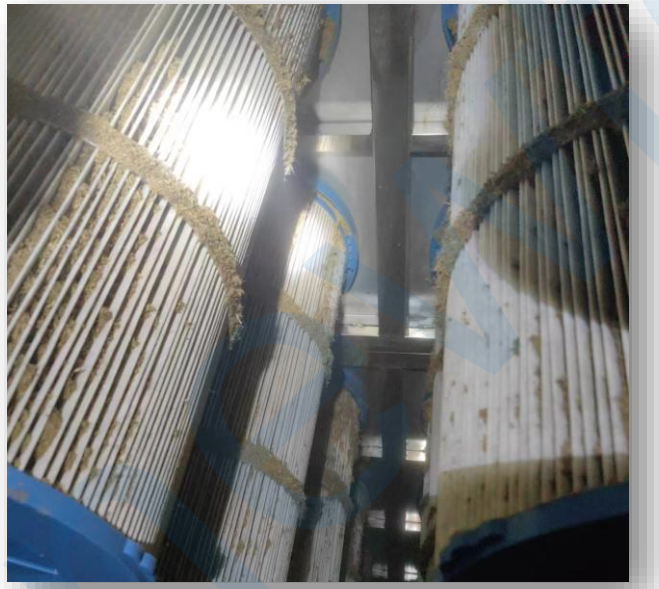
Technological innovation - Solving dust problems

Dusts

Can cause serious dust buildup if nothing is done.

Technological innovation

- Automatic dust extraction system beneath the belt
- Pulsed dust removal with automatic backwash



Technological innovation – Enhancing heat transfer rate

Material remains stationary

Can cause lower heat transfer rate.

Technological innovation

- Fixed harrow tilling the material to improve heat transfer rate

Technological innovation – Reducing corrosion

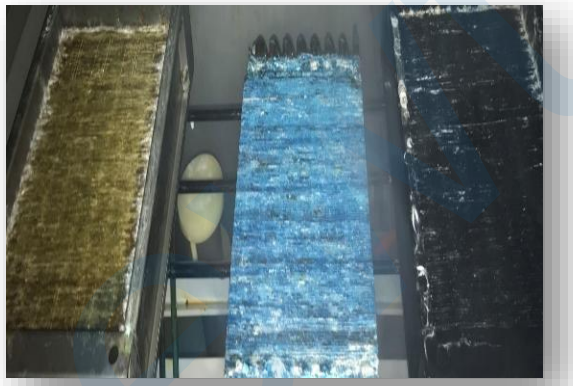
Corrosion

- Dust causes heat exchanger corrosion
- Corrosion caused by hydrogen sulfide, ammonia
- Intercrystalline corrosion in contact with materials
- Scaling and corrosion in cooling systems

General copper tube and the corrosion-resistant tube we use after corrosion test

Innovative solutions

- Dust reduction
- Heat exchanger in stainless copper/steel
- Stainless steel 316L or duplex stainless steel is used for the mesh belt and bracket.
- Quicklime and chlorinated salts such as iron and aluminum are not used.
- If possible, use air-cooling system.
- Cooling water lines are sealed and made of high-grade stainless steel.



Radiator fins salt spray resistance test

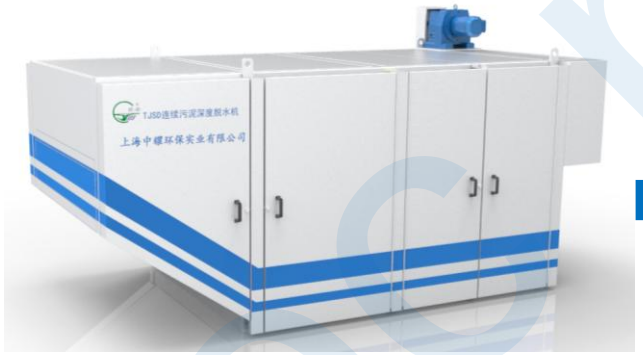
Heat pump compressor installed in a separate compartment

Combinated With High-pressure Belt Filter Press

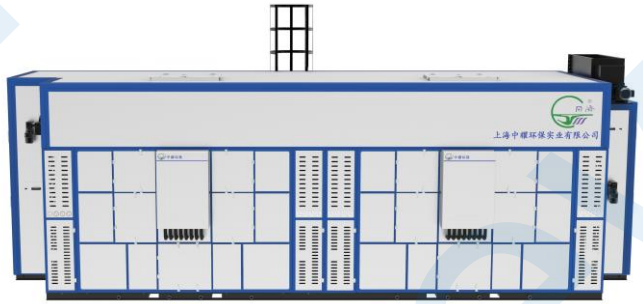
It’s a remarkable technical innovation to combine TJSD high-pressure belt filter press with TJBH low-temperature belt dryer.

The material is first passed through the high-pressure belt filter press to increase the dryness to 30%DS without adding lime or other chemicals, and then passed through the low temperature belt dryer to get the dry product with 40-90% DS.

This has brought many advantages .....



High-pressure Belt Filter Press



Low-temperature Belt Dryer

Combination of High-pressure Belt Filter Press and Low-temperature Belt Dryer

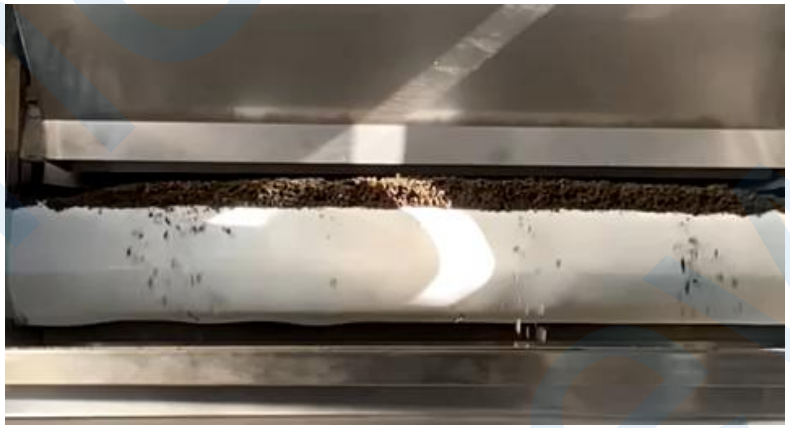
A process of TJSD+TJBH for demenstration

	TJSD High-pressure Belt Filter Press	TJBH Low-temperature Belt Dryer
Process	Mechanical dehydration	Thermal evaporation
Step 1	Feed 10 tons, 18% DS Output 6 tons, 30% DS	
Step 2		Feed 6 tons, 30% DS Output 3 tons, 60% DS
Water removal	4 tons	3 tons
Rate to total water removal	4 / 7 = 57%	3 / 7 = 43%

Advantages of combination of TJSD and TJBH

Better Pelletizing

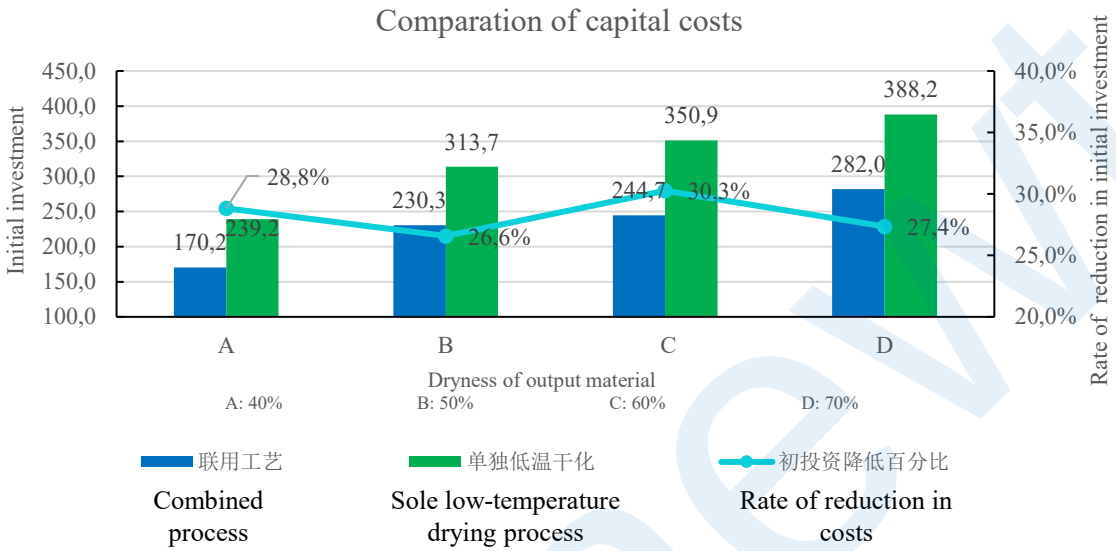
The material that has passed through the high-pressure belt hydrator has a granular form more suitable for belt drying than otherwise.

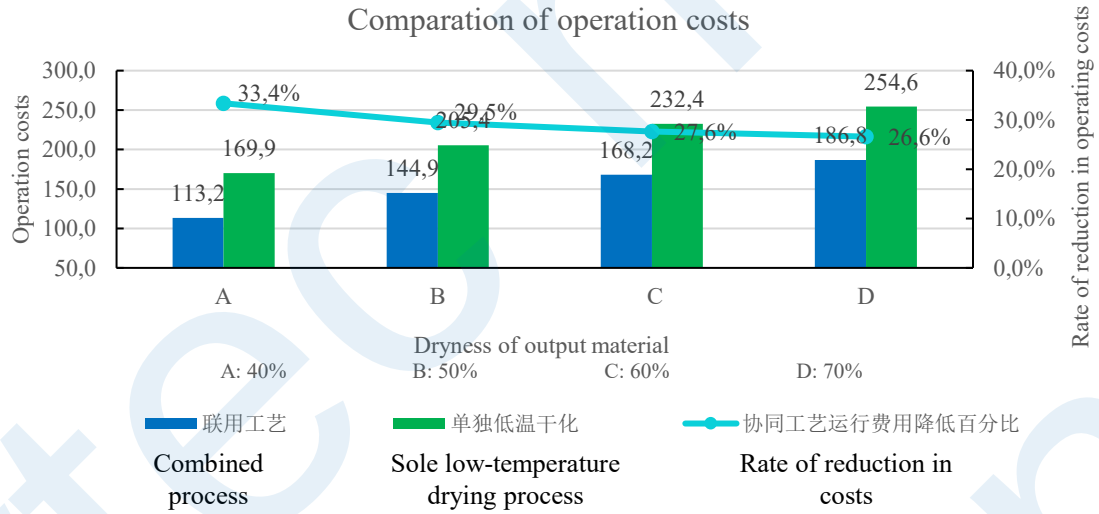


Sludge passed through high-pressure belt hydrator

Sludge without passing through high-pressure belt hydrator

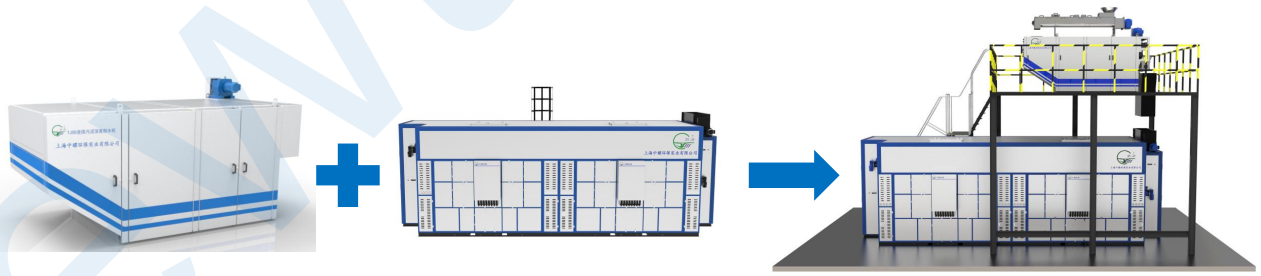
Advantages of combination of TJSD and TJBH





Lower capital and operation costs

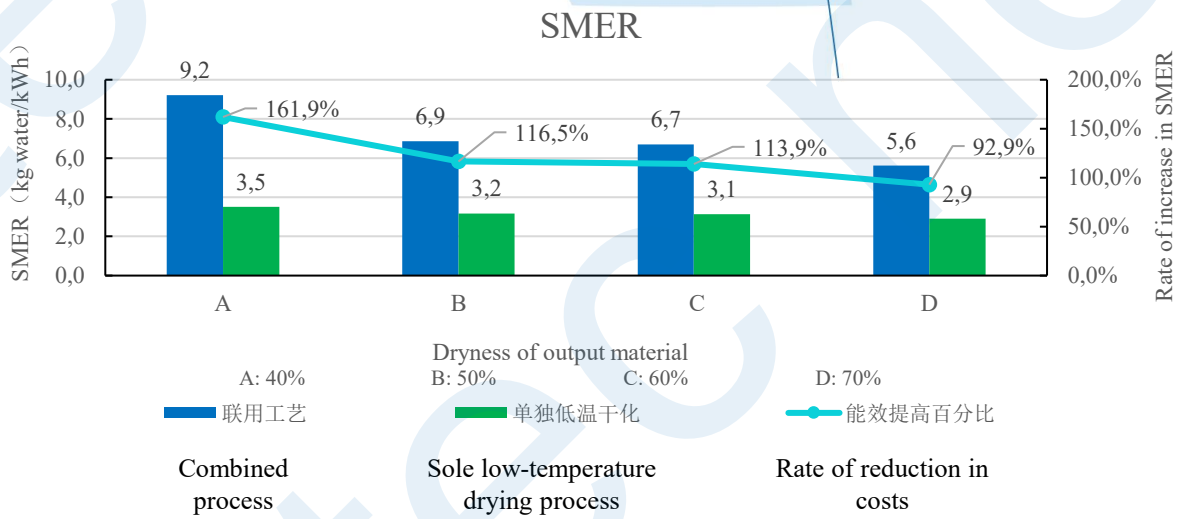
The investment and operating costs of the combined process are about 30% lower than those of the low-temperature belt dryer alone.



Advantages of combination of TJSD and TJBH

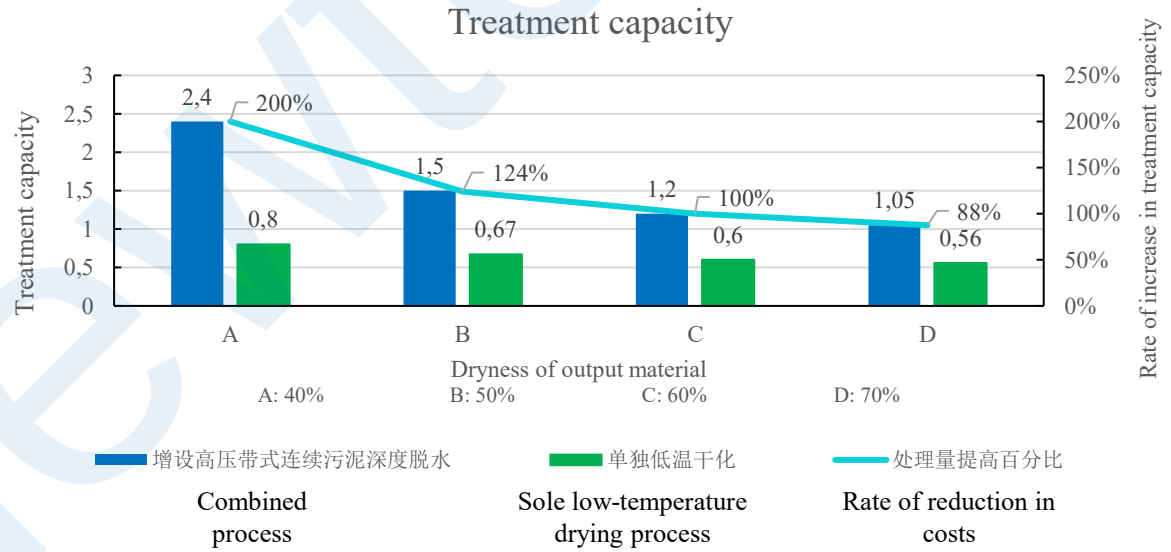
Higher Heat Transfer Efficiency

The SMER of the combined process is up to 9.2 kg water per kWh, obviously higher than those of the low-temperature belt dryer alone, and nearly 4 times of what is requested by energy industry standard (NB/T 10156-2019). It's because that the mechanical dewatering is less energy consuming and the material has better granual form after treatment by high-pressure belt filter press.



Higher Treatment Capacity

The treatment capacity of the combined process is 90-200% higher than those of the low-temperature belt dryer alone.



Excellent production and quality control

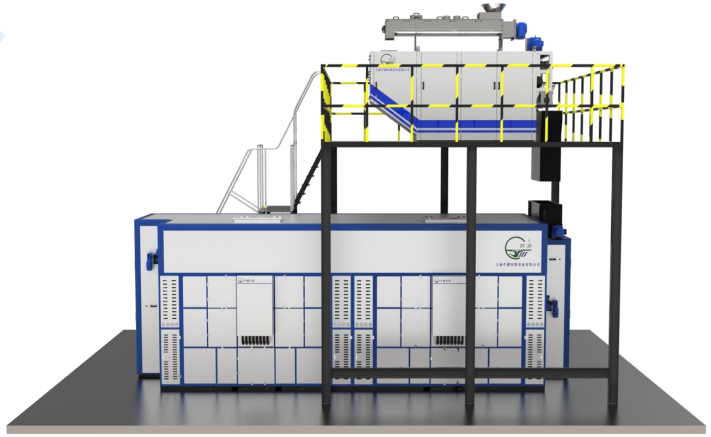
Workshop in Qidong city

Rich experience in supply and after-sales

Combined process on municipal sludge treatment

Combined process on industrial sludge treatment

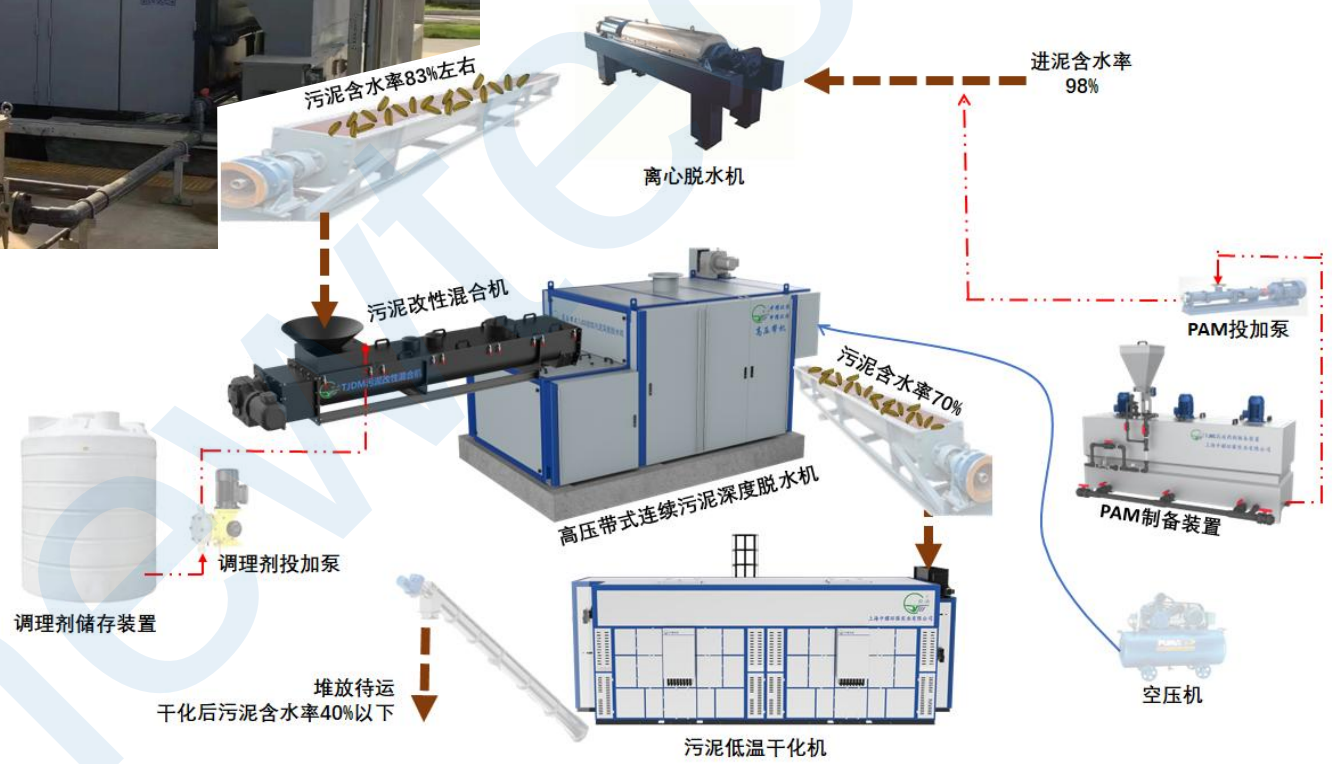
Combined process on agricaltrure and animal solid waste treatment



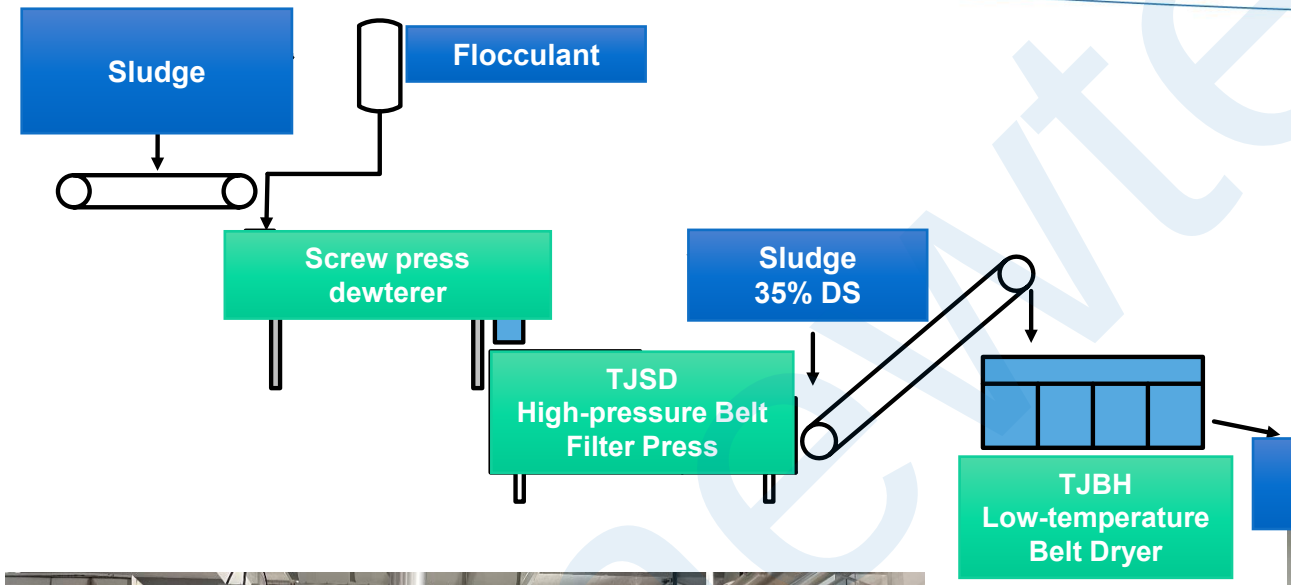
Fact - WWTP in Huizhou City

High-pressure Belt Filter Press Combined With **Low-temperature Belt Dryer**

Capacity: 12 t DS/d

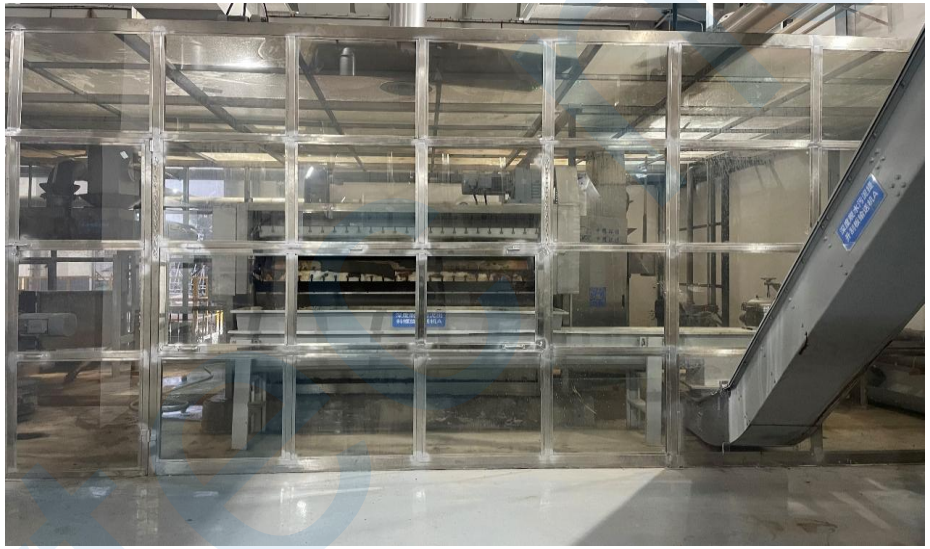


Fact - WWTP in Ganzhou city



High-pressure Belt Filter Press Combined With **Low-temperature Belt Dryer**

Capacity: 24 t DS/d

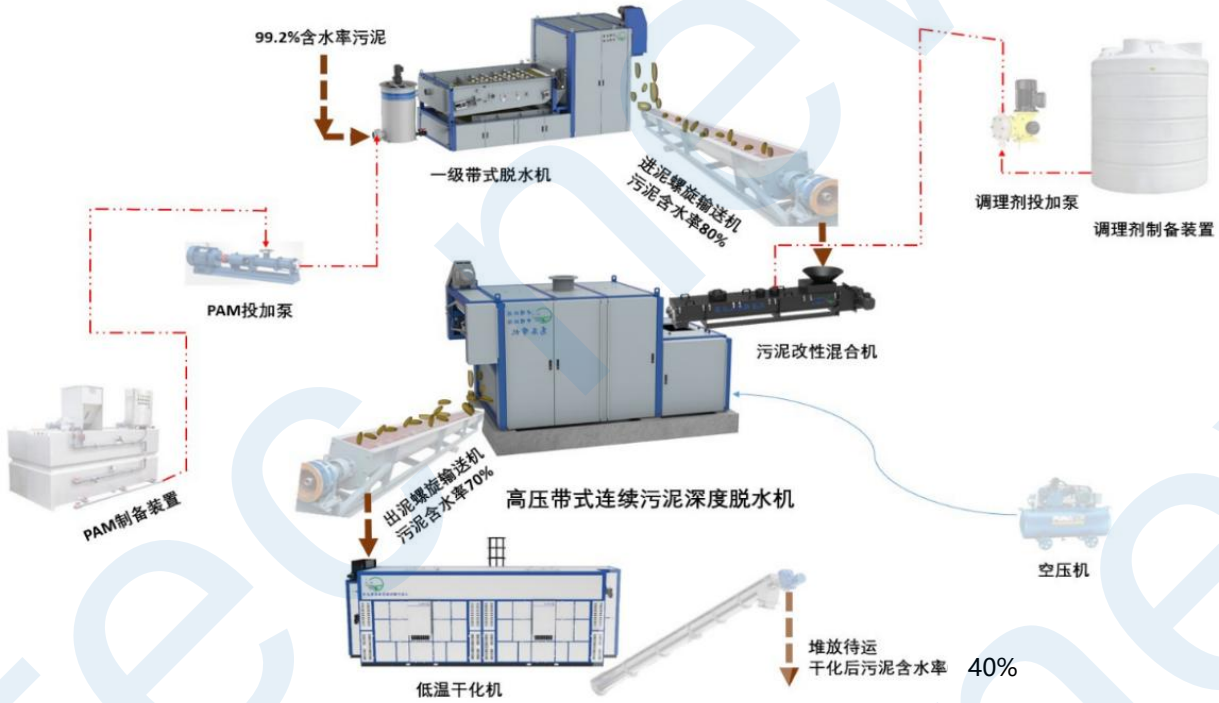


Fact - WWTP in Jiansu Province

High-pressure Belt Filter Press Combined With **Low-temperature Belt Dryer**

Capacity: 7 t DS/d

Output: >=60% DS

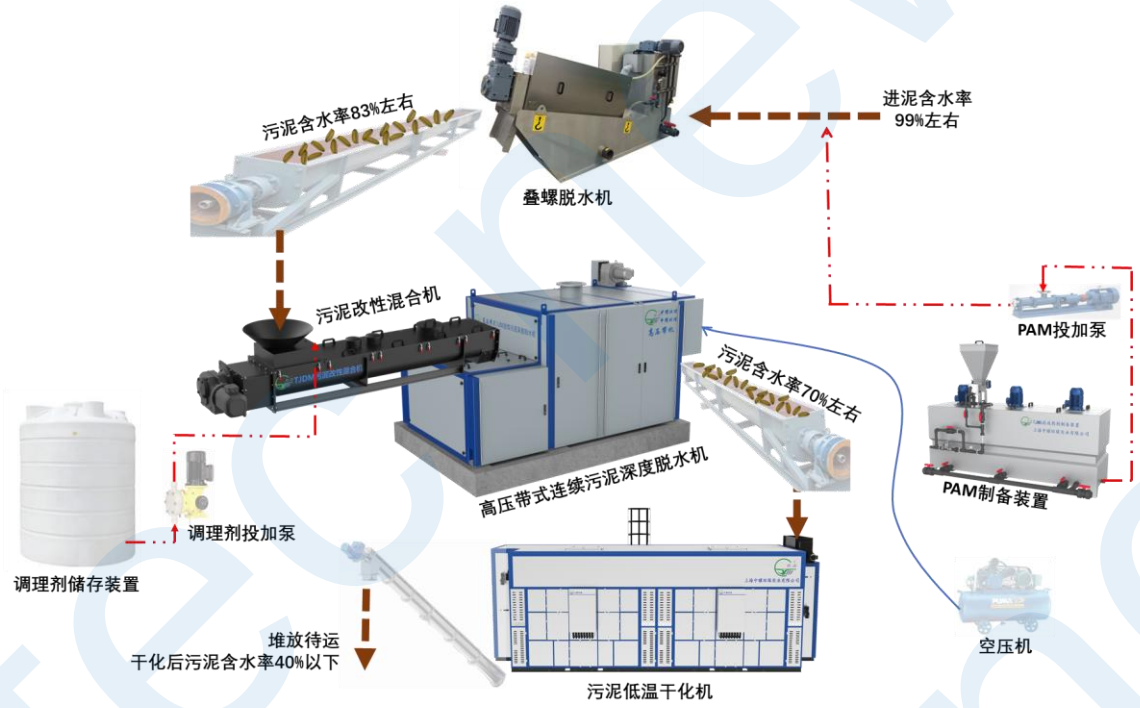


Fact - WWTP in Shandong Province

High-pressure Belt Filter Press Combined With **Low-temperature Belt Dryer**

Water treatment capacity: 21,000 m³ DS/d

Sludge treatment output: >=60% DS



Stable and reliable operation

Thank You

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